

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (Currently Amended) A method for cleaning an exhaust gas emitted from an internal combustion engine, wherein:

exhaust gas having an air-fuel ratio higher than a theoretical air-fuel ratio and exhaust gas having an air-fuel ratio less than or equal to the theoretical air-fuel ratio are alternately made to contact a catalyst to clean the exhaust gas discharged from the internal combustion engine thereby removing nitrogen oxides in exhaust gas;

said catalyst contains,

at least one element selected from a first group consisting of alkaline and alkaline earth metals;

Rh and Pt;

at least one element selected from a second group consisting of Ti, Si[[,]] and Zr; and

a CO adsorbent component where the absolute value (ΔH) of CO adsorbent enthalpy on the metal single crystal (111) surface is 142 KJ/mol or more, said CO adsorbent component comprising at least one element selected from the group consisting of Pd, Ir, and Ru in an amount of from 0.20 to 3.5 grams per 100 grams of a carrier for said catalyst;

said catalyst has a CO desorption capacity that reaches a maximum level at a temperature within the range from 200 to 220°C. when a heating test is performed exclusively on said catalyst by heating at the rate of 5 to 10°C/min. in a He gas flow after said catalyst is saturated with CO by adsorption at 100°C.

Claim 2. (Cancelled)

Claim 3. (Previously Presented) An exhaust gas cleaning method for an internal combustion engine according to Claim 1, wherein said first group consists of:

Na, Mg, K, Li, Cs, Sr and Ca.

Claim 4. (Original) An exhaust gas cleaning method for internal combustion engine according to Claim 1 wherein said catalyst further contains Ce.

Claim 5. (Currently Amended) An exhaust gas cleaning method for an internal combustion engine, comprising:

placing an exhaust gas cleaning catalyst in an exhaust gas flow path of the internal combustion engine, said catalyst capturing NO_x when the air-fuel ratio of exhaust gas is higher than theoretical air-fuel ratio, and removing said captured NO_x by reduction when the air-fuel ratio of exhaust gas is less than or equal to theoretical air-fuel ratio; and

causing an exhaust gas having an air-fuel ratio higher than the theoretical air-fuel ratio and an exhaust gas having an air-fuel ratio less than or equal to the theoretical air-fuel ratio alternately to contact said catalyst, thereby removing nitrogen oxides in exhaust gas; wherein,

said catalyst contains,

at least one alkaline or alkaline earth metal selected from the group consisting of Na, Mg, K, Li, Cs, Sr and Ca, on the surface of a porous carrier;

at least one element selected from the group consisting of Pd, Ir and Ru, in the amount of from 0.20 to 3.5 grams per 100 grams of a carrier for said catalyst ; and

at least one element selected from the group consisting of Ti, Si and Zr;

ratios of components relative to 100 parts by weight of said porous carrier are 5 to 30 parts by weight for alkaline metal or alkaline earth metal in total, 8 to 35 parts by weight for Ti, 3 to 25 parts by weight for Si, 3 to 25 parts by weight for Zr, 0.05 to 0.5 parts by weight for Rh, 1.5 to 5 parts by weight for Pt, and 0.25 to 3 parts by weight for Pd, Ir and Ru in total; and

said catalyst has a CO desorption capacity that reaches a maximum level at a temperature within the range from 200 to 220°C when a heating test is performed exclusively on said catalyst by heating it at the rate of 5 to 10°C/min. in a He gas flow after said catalyst is saturated with CO by adsorption at 100°C.

Claims 6.-18. (Cancelled.)

Claim 19. (Currently Amended) An exhaust gas cleaning method for an internal combustion engine according to Claim [[2,]] 1, wherein said first group consists of:

Na, Mg, K, Li, Cs, Sr and Ca.

Claim 20. (Currently Amended) An exhaust gas cleaning method for internal combustion engine according to Claim [[2]] 1, wherein said catalyst further contains Ce.

Claim 21. (Previously Presented) The exhaust gas cleaning method according to Claim 5, wherein said second group consists of Ti and Zr.

Claim 22. (Previously Presented) An exhaust gas cleaning method for an internal combustion engine, comprising:

placing an exhaust gas cleaning catalyst in an exhaust gas flow path of the internal combustion engine, said catalyst capturing NO_x when the air-fuel ratio of exhaust gas is higher than theoretical air-fuel ratio, and

removing said captured NO_x by reduction when the air-fuel ratio of exhaust gas is less than or equal to theoretical air-fuel ratio; and

causing an exhaust gas having an air-fuel ratio higher than the theoretical air-fuel ratio and an exhaust gas having an air-fuel ratio less than or equal to the theoretical air-fuel ratio alternately to contact said catalyst, thereby removing nitrogen oxides in exhaust gas; wherein,

said catalyst contains,

at least one alkaline or alkaline earth metal selected from the group consisting of Na, Mg, K, Li, Cs, Sr and Ca, on the surface of a porous carrier;

at least one element selected from the group consisting of Pd, Ir and Ru; and

at least one element selected from the group consisting of Ti, Si and Zr;

ratios of components relative to 100 parts by weight of said porous carrier are 5 to 30 parts by weight for alkaline metal or alkaline earth metal in

total, 8 to 35 parts by weight for Ti, 3 to 25 parts by weight for Si, 3 to 25 parts by weight for Zr, 0.05 to 0.5 parts by weight for Rh, 1.5 to 5 parts by weight for Pt, and 0.25 to 3 parts by weight for Pd, Ir and Ru in total;

said catalyst has a CO desorption capacity that reaches a maximum level at a temperature within the range from 200 to 220°C when a heating test is performed exclusively on said catalyst by heating it at the rate of 5 to 10°C/min. in a He gas flow after said catalyst is saturated with CO by adsorption at 100°C; and

said CO adsorbent compound comprise at least one element selected from the group consisting of Pd, Ir and Ru.

Claim 23. (Previously Presented) The method according to Claim 1, wherein said second group consists of Ti and Zr.

Claim 24. (Currently Amended) ~~The method according to Claim 1, wherein~~ A method for cleaning an exhaust gas emitted from an internal combustion engine, wherein:

exhaust gas having an air-fuel ratio higher than a theoretical air-fuel ratio and exhaust gas having an air-fuel ratio less than or equal to the

theoretical air-fuel ratio are alternately made to contact a catalyst to clean the exhaust gas discharged from the internal combustion engine thereby removing nitrogen oxides in exhaust gas;

said catalyst contains,

at least one element selected from a first group consisting of alkaline and alkaline earth metals;

Rh and Pt;

at least one element selected from a second group consisting of Ti, Si and Zr; and

a CO adsorbent component where the absolute value (ΔH) of CO adsorbent enthalpy on the metal single crystal (111) surface is 142 KJ/mol or more, said CO adsorbent component comprising at least one element selected from the group consisting of Pd, Ir, and Ru;

said catalyst has a CO desorption capacity that reaches a maximum level at a temperature within the range from 200 to 220°C. when a heating test

is performed exclusively on said catalyst by heating at the rate of 5 to 10°C/min.
in a He gas flow after said catalyst is saturated with CO by adsorption at 100°C;

said catalyst comprises a composite oxide formed between said at least one element selected from said first group and said at least one element selected from said second group.

Claim 25. (Previously Presented) The method according to Claim 1, wherein said catalyst is formed by heat treatment at a temperature of at least 600°C.

Claim 26. (Currently Amended) The method according to Claim 1, wherein said catalyst is formed by heat treatment at a temperature of approximately 700°C.

Claim 27. (Currently Amended) ~~The method according to Claim 23,~~
~~wherein~~ A method for cleaning an exhaust gas emitted from an internal combustion engine, wherein:

exhaust gas having an air-fuel ratio higher than a theoretical air-fuel ratio and exhaust gas having an air-fuel ratio less than or equal to the theoretical air-fuel ratio are alternately made to contact a catalyst to clean the

exhaust gas discharged from the internal combustion engine thereby removing nitrogen oxides in exhaust gas;

said catalyst contains,

at least one element selected from a first group consisting of alkaline and alkaline earth metals;

Rh and Pt;

at least one element selected from a second group consisting of Ti, Si and Zr; and

a CO adsorbent component where the absolute value (ΔH) of CO adsorbent enthalpy on the metal single crystal (111) surface is 142 KJ/mol or more, said CO adsorbent component comprising at least one element selected from the group consisting of Pd, Ir, and Ru;

said catalyst has a CO desorption capacity that reaches a maximum level at a temperature within the range from 200 to 220°C. when a heating test

is performed exclusively on said catalyst by heating at the rate of 5 to 10°C/min.
in a He gas flow after said catalyst is saturated with CO by adsorption at 100°C;

said second group consists of Ti and Zr; and

said composite oxide is formed by heat treatment of said catalyst.

Claim 28. (Previously Presented) The method according to Claim 1,
wherein said at least one element selected from said second group is Zr.

Claim 29. (Previously Presented) The method according to Claim 5,
wherein said at least one element selected from said second group is Zr.